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U. S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

Washington

(March 1, 1940)

Letter
Circular
LC 584

(Supersedes
LC 74)

STANDARD SPECIFICATIONS FOR SIEVES

Although it had been recognized for many years that a series of standard sieves should be based on a definite and logical succession of openings, it was not until 1916 that definite steps were taken by this Bureau to establish and publish a specification for a complete set of testing sieves. After studying the problem and consulting both manufacturers and users, a conference was held at the National Bureau of Standards on April 20, 1916 at which a tentative standard scale for testing sieves was adopted. Since then several revisions have been made to increase the usefulness and availability of sieves made to series.

The present specifications are those that were approved on December 5, 1939, by the American Standards Association as American Standard under the designation Z 23.1-1939. This action was taken on recommendation of the ASA sectional committee Z23 and of the joint sponsors, the National Bureau of Standards and the American Society for Testing Materials, each of which had already adopted the specifications, the former by a mimeographed announcement dated June 1, 1939, and the latter under their serial designation E11-39.

These specifications include requirements for a fine series of woven wire cloth sieves which is essentially identical with the specification for the U. S. Standard Sieve Series sponsored by the National Bureau of Standards for many years, the early history of which is briefly outlined in the paragraph above. There are, however, revisions in several particulars which, it is believed, improve the former specification. Requirements for a coarse series of woven wire cloth sieves and for round-hole screens (sieves) and for square-hole perforated plate screens (sieves) are also included.

The National Bureau of Standards will continue its practice of referring to this series of woven wire cloth sieves, including now by extension the Coarse Series, as the "United States Standard Sieve Series". Although fully recognizing the advantage of the micron designation, it will for the present continue to use the arbitrary number, commonly referred to as the U. S. Standard Sieve Series Number. It will, however, cooperate fully with the ASTM, with sieve manufacturers and with sieve users, in the use of the micron designation. The Bureau considers that some latitude is implied in the designations of sieves; for example, that a No. 70 sieve may be correctly designated in any of the following ways:

No. 70
No. 70 (210 Micron)
210 Micron
210 Micron (No. 70)

This sieve should not be called a 70-mesh sieve. In order to avoid confusion, the word "mesh" should not be used in designating sieves of these specifications. The statement that a sieve is a certain"mesh", without giving other data, is meaningless because it does not give information about the important dimension in the sieve, namely, the average opening. Since in a sieve which meets these specifications the wire diameter and average size of opening may have any values within the specified limits, the actual "mesh" for a certified sieve may be anywhere within rather wide limits which can be readily calculated, if desired. In Table I of the specifications, the primary designation of sieves in microns with the U. S. Standard Sieve Series No. in parentheses, is retained in the form recommended by A.S.A. Committee Z 23.

The National Bureau of Standards will test sieves for conformity to these specifications. For sieves of the Fine Series of Woven Cloth Sieves ("U. S. Standard Sieve Series") it will follow the general procedure of section 1 of the Appendix in making the test. Full-height standard 8-inch No. 200 (74 micron) sieves will be tested with a standard sample of cement to determine the sieving correction, when specifically requested.

Sieves found to conform to the specifications for Woven Wire Cloth Sieves (Coarse and Fine Series), Round-Hole Screens (Sieves), and Square-Hole Perforated Plate Screen (Sieves), but excluding the special sieves referred to in the note following Section 3(b), will be marked with the Bureau's precisic seal, an identification number, and, (effective April 1, 1940) the year of test. Except in special cases certificates will not be issued.

THE PRECISION SEAL OF THE NATIONAL BUREAU OF STANDARDS ON ANY SIEVE INDICATES THAT THE SIEVE HAS BEEN TESTED AT THE NATIONAL BUREAU OF STANDARDS AND FOUND TO CONFORM TO THE SPECIFICATIONS.

The National Bureau of Standards reserves the right to reject any sieve because of defects which may impair its accuracy or usefulness even though not specifically covered in the specifications.

Sieves should be sent to the National Bureau of Standards, Attention Division II-1, Washington, D. C., shipping charges prepaid. A letter requesting the test should be mailed to the Bureau. After completion of the test, sieves will normally be returned by express or freight with transportation charges collect.

The attached Fee Schedule 217 applies particularly to the U. S. Standard Sieve Series (the Fine Series of Woven Wire Cloth Sieves). For the present the same fees will be charged for the testing of all other sieves covered by the specifications.

STANDARD SPECIFICATIONS FOR SIEVES FOR TESTING PURPOSES

Wire Cloth Sieves, Round-Hole and Square-Hole Screens or Sieves

SCOPE

1. These specifications cover woven-wire cloth sieves, round-hole screens (sieves) and square-hole perforated plate screens (sieves) for precision testing in the classification of materials according to size (mechanical analysis, fineness, and particle size determinations). The sieves covered by these specifications are intended for general use (Note 1). A method of calibrating woven wire cloth sieves is included as information in the Appendix.

Note 1. - Some industries may possibly require more restricted specifications for sieves for special testing purposes.

WOVEN WIRE CLOTH SIEVES

SIEVE CLOTH

2. (a) Wire cloth for standard sieves shall be woven (not twilled, except the cloth of the 62-, 53-, 44-, and 37-micron sieves) from brass, bronze, or other suitable wire, and shall not be coated or plated.

(b) The average opening between the adjacent warp and the adjacent shoot wires, taken separately, shall conform to that given in column 2 of Table I, within the "permissible variation in average opening" given in column 4. Column 3 gives the approximate equivalents in inches of the basic values in millimeters given in column 2. The average diameter of the warp and of the shoot wires, taken separately, of the cloth of any given sieve shall be within the limits given in column 6 of Table I. Column 7 gives the approximate equivalents in inches of the basic values in millimeters given in column 6. The maximum width of opening between adjacent warp or shoot wires shall not exceed the nominal width of opening by more than the "permissible variation in maximum opening" given in column 5 of Table I. An exception may be made, in the case of 8-in. sieves, if the total length of all the portions of rows of openings exceeding this maximum width is less than 4 in. in both the warp and the shoot directions, considered separately, and provided that the sieve is not rejected under Paragraph (d). For sieves from the 1000-micron (No. 18) to the 37-micron (No. 400) size, inclusive, not more than 5 per cent of the openings shall exceed the nominal opening by more than one-half of the permissible variation in maximum opening.

TABLE I.- NOMINAL DIMENSIONS, PERMISSIBLE VARIATIONS, AND LIMITS FOR WOVEN WIRE CLOTH OF STANDARD SIEVES

Size or Sieve Designation	Sieve Opening		Permissible Variations in Average Opening, per cent	Permissible Variations in Maximum Opening,[a] per cent	Wire Diameter	
	mm	in. (approx. equivalents)			mm	in. (approx. equivalents)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			COARSE SERIES			
(4.24-in.)**	107.6	4.24	±2	+3	5.0 to 9.7	0.220 to 0.380
4-in.	101.6	4.00	±2	+3	5.6 to 9.7	0.220 to 0.380
3 1/2-in.	88.9	3.50	±2	+3	5.3 to 9.3	0.210 to 0.365
3-in.	76.2	3.00	±2	+3	4.6 to 8.1	0.180 to 0.320
2 1/2-in.	63.5	2.50	±2	+3	4.4 to 7.1	0.175 to 0.280
(2.12-in.)**	53.8	2.12	±2	+3	4.1 to 6.2	0.160 to 0.245
2-in.	50.8	2.00	±2	+3	4.1 to 6.2	0.160 to 0.245
1 3/4-in.	44.4	1.75	±2	+3	3.6 to 5.7	0.150 to 0.225
1 1/2-in.	38.1	1.50	±2	+3	3.7 to 5.3	0.145 to 0.210
1 1/4-in.	31.7	1.25	±2	+3	3.5 to 4.8	0.140 to 0.190
(1.06-in.)**	26.9	1.06	±3	+5	3.43 to 4.50	0.135 to 0.177
1-in.	25.4	1.00	±3	+5	3.43 to 4.50	0.135 to 0.177
7/8-in.	22.2	0.875	±3	+5	3.23 to 4.22	0.127 to 0.166
3/4-in.	19.1	0.750	±3	+5	3.10 to 3.91	0.122 to 0.154
5/8-in.	15.9	0.625	±3	+5	2.74 to 3.43	0.108 to 0.135
(0.530-in.)**	13.4	0.530	±3	+5	2.39 to 3.10	0.094 to 0.122
1/2-in.	12.7	0.500	±3	+5	2.39 to 3.10	0.094 to 0.122
7/16-in.	11.1	0.438	±3	+5	2.23 to 2.84	0.088 to 0.112
3/8-in.	9.52	0.375	±3	+5	2.11 to 2.59	0.083 to 0.102
5/16-in.	7.93	0.312	±3	+5	1.85 to 2.36	0.073 to 0.093
(0.265-in.)**	6.73	0.265	±3	+5	1.60 to 2.11	0.063 to 0.083
1/4-in. (No.3)	6.35	0.250	±3	+5	1.60 to 2.11	0.063 to 0.083

** The five sieves marked in the first column with a double asterisk (**) may be used instead of th 4-in., 2-in., 1-in., 1/2-in., and 1/4-in. sieves when it is desired to have a series of sieves nesting with the Fine Series and continuing that series with the $\sqrt{2}$: 1 ratio. All of the other sieves liste above are in a $\sqrt{2}$: 1 ratio with the Fine Series within the limit of the specified permissible variations. Care should be taken in designating the five sieves marked with the double asterisk; they shou not be designated as 4-in., 2-in., 1-in., 1/2-in., and 1/4-in., but as 4.24-in., 2.12-in., 1.06 in., 0.530-in., and 0.265-in. (or by the manufacturer's nominal values, for example, for the last three 1.050-in., 0.525-in., and 0.263-in.)

FINE SERIES[b]

5660 micron(No. 3 1/2)	5.66	0.223	±3	+10	1.28 to 1.90	0.050 to 0.075
4760 micron(No. 4)	4.76	0.187	±3	+10	1.14 to 1.68	0.045 to 0.066
4000 micron(No. 5)	4.00	0.157	±3	+10	1.00 to 1.47	0.039 to 0.058
3360 micron(No. 6)	3.36	0.132	±3	+10	0.87 to 1.32	0.034 to 0.052
2830 micron(No. 7)	2.83	0.111	±3	+10	0.80 to 1.20	0.031 to 0.047
2380 micron(No. 8)	2.38	0.0937	±3	+10	0.74 to 1.10	0.0291 to 0.0433
2000 micron(No. 10)	2.00	0.0787	±3	+10	0.68 to 1.00	0.0268 to 0.0394
1680 micron(No. 12)	1.68	0.0661	±3	+10	0.62 to 0.90	0.0244 to 0.0354
1410 micron(No. 14)	1.41	0.0555	±3	+10	0.56 to 0.80	0.0220 to 0.0315
1190 micron(No. 16)	1.19	0.0469	±3	+10	0.50 to 0.70	0.0197 to 0.0276
1000 micron(No. 18)	1.00	0.0394	±5	+15[a]	0.43 to 0.62	0.0169 to 0.0244
840 micron(No. 20)	0.84	0.0331	±5	+15[a]	0.38 to 0.55	0.0150 to 0.0217
710 micron(No. 25)	0.71	0.0280	±5	+15[a]	0.33 to 0.48	0.0130 to 0.0189
590 micron(No. 30)	0.59	0.0232	±5	+15[a]	0.29 to 0.42	0.0114 to 0.0165
500 micron(No. 35)	0.50	0.0197	±5	+15[a]	0.26 to 0.37	0.0102 to 0.0146
420 micron(No. 40)	0.42	0.0165	±5	+25[a]	0.23 to 0.33	0.0091 to 0.0130
350 micron(No. 45)	0.35	0.0138	±5	+25[a]	0.20 to 0.29	0.0079 to 0.0114
297 micron(No. 50)	0.297	0.0117	±5	+25[a]	0.170 to 0.253	0.0067 to 0.0100
250 micron(No. 60)	0.250	0.0098	±5	+25[a]	0.149 to 0.220	0.0059 to 0.0087
210 micron(No. 70)	0.210	0.0083	±5	+25[a]	0.130 to 0.187	0.0051 to 0.0074
177 micron(No. 80)	0.177	0.0070	±6	+40[a]	0.114 to 0.154	0.0045 to 0.0061
149 micron(No. 100)	0.149	0.0059	±6	+40[a]	0.096 to 0.125	0.0038 to 0.0049
125 micron(No. 120)	0.125	0.0049	±6	+40[a]	0.079 to 0.103	0.0031 to 0.0041
105 micron(No. 140)	0.105	0.0041	±6	+40[a]	0.063 to 0.087	0.0025 to 0.0034
88 micron(No. 170)	0.088	0.0035	±6	+40[a]	0.054 to 0.073	0.0021 to 0.0029
74 micron(No. 200)	0.074	0.0029	±7	+60[a]	0.045 to 0.061	0.0018 to 0.0024
62 micron(No. 230)	0.062	0.0024	±7	+90[a]	0.039 to 0.052	0.0015 to 0.0020
53 micron(No. 270)	0.053	0.0021	±7	+90[a]	0.035 to 0.046	0.0014 to 0.0018
44 micron(No. 325)	0.044	0.0017	±7	+90[a]	0.031 to 0.040	0.0012 to 0.0016
37 micron(No. 400)	0.037	0.0015	±7	+90[a]	0.023 to 0.035	0.0009 to 0.0014

[a] For sieves from the 1000-micron (No. 18) to the 37-micron (No. 400) size, inclusive, not more than 5 per cent of the openings shall exceed the nominal opening by more than one-half of the permissible variation in maximum opening.

[b] See Note 2, Section 2.

(c) Both the warp and shoot wires shall be crimped in such a manner that they will be rigid when in use.

(d) There shall be no punctures or other obvious defects in the cloth.

Note 2.- The micron designation of the fine sieve series represents a strong trend among users of precision sieves toward the use of the micron terminology in reporting particle sizes. The openings of successive sieves of the fine series progress in the ratio $\sqrt[4]{2}$: 1, and in selecting sieves from this series it is customary to take each sieve in a given range, every alternate sieve, or every fourth sieve.

STANDARD 8-IN. SIEVE FRAMES

3.(a) Sieve Frames for Coarse Series. - Sieves of the coarse series having nominal openings of less than 1 in. may have frames of the standard 8-in. size (see Section 3(b)) or may have larger frames as may be specified in individual cases. Frames for sieves of the coarse series having nominal openings of 1 in. or more may be made of either hard-wood or metal andmay be square, rectangular, or circular, as specified, a size larger than 8-in. being recommended. Frames, covers, and pans of the standard 8-in. size shall be made of brass, unless otherwise specified.

Note 3: Special Sieves. - These specifications do not preclude the use of special sieves for special purposes, as for example sieves having a diameter other than 8 in. or the nesting sieves for field use. When such sieves are used, in place of the standard 8-in. sieve, the cloth of the sieves should be required to conform to these specifications. The use of other than standard 8-in. sieves where these standard sieves could be used should be discouraged, as the results are not necessarily comparable.

(b) Sieve Frames for Fine Series. - Frames for all sieves of the fine series shall be the standard 8-in. size, except that frames 3 in. in diameter may be used in the case of sieves No. 100 and finer, used primarily in the testing of paint pigments. The standard frames shall be circular, 8 in. (20.32 cm) in diameter. The height of the sieve from the top of the frame to the cloth shall be either about 2 in. (5 cm), or 1 in. (2.5 cm). Sieves having a height of 2 in. (5 cm) shall be designated as full-height sieves; those having a height of 1 in. (2.5 cm) as half-height sieves. The permissible variation on the mean inside diameter 3/16 in. below the top of the sieve shall be plus 1/32 in. The bottom of the sieve or "sieve skirt" shall be so constructed as to have an easy sliding fit in any sieve conforming to the above permissible variations and in no case shall this outside diameter be less than 7.970 in. nor more than 8.000 in. Pans and covers shall be so made as to be interchangeable with standard sieves.

(c) Mounting of Cloth in Frame.- The cloth shall be mounted on the frame without distortion, looseness, or waviness. To prevent the material being sieved from catching in the joint between the cloth and the frame, the joint shall be smoothly filled with solder or so made that the material will not catch.

THREE-INCH SIEVES

4. (a) Sieves 3 in. in diameter, used for testing paint pigments, shall be made from standard wire cloth No. 100 or finer. The sieve frames shall be circular, about 3 in. (7.6 cm) in inside diameter, and shall not vary from this by more than plus or minus 0.16 in. (0.4 cm). The depth of the sieve from the top of the frame to the cloth shall not be less than 0.75 in. (1.9 cm).

(b) The frames shall be constructed of first quality sheet brass in such a manner as tobe permanently rigid. To prevent the material being sieved from catching in the joint between the cloth and the frame, the joint shall be smoothly filled with solder or so made that the material will not catch.

LABEL MARKING

5. Each sieve (except the 3-in. sieve) shall bear a label marked with the following information: the designation of the sieve (the nominal size of the opening in inches for the coarse series, and the micron designation or the U. S. Standard Sieve Series Number for the fine series), the name of the series (for example, "U. S. Standard Sieve Series," "American Standard Series," or a specific manufacturer's series), the name of the manufacturer or responsible distributor, and the opening in inches and millimeters.

Note 4.- The requirements prescribed in Section 5 shall not be considered as requiring that the opening in inches be given twice on the labels for sieves of the Coarse Series, or that the opening in millimeters be given in addition to the micron designation on the labels for sieves of the Fine Series.

ROUND-HOLE PLATE SCREENS

(Sieves)

PLATES

6. Plates used in the manufacture of round-hole screens shall be made of brass, bronze, steel, or other rigid metal. Thickness of plates shall be governed by size of openings as well as screening area of screens and shall conform to the requirements prescribed in Table II.

TYPE OF FRAME

7. Frames for laboratory screens shall be at least 8 in. in diameter. Frames for standard 8-in. laboratory screens

shall conform to the requirements specified in Section 3 for woven wire-cloth sieves. Frames for large screens may be made of either hardwood or metal and may be square, rectangular, or circular, as specified. For screens having circular openings 1 in. in diameter or larger, frames larger than 8 in. in diameter are recommended.

TABLE II.- THICKNESS OF PLATES FOR ROUND-HOLE SCREENS.

Screening Area, sq. in.	Diameter of Opening in.	Thickness of Plate, in.	
		Minimum	Maximum
Under 100	All sizes.....	0.049	0.066
100 and over	1/16 and 1/8	0.049	0.066
	1/4 to 2 1/2, incl....	0.060	0.100
	3 and 3 1/2.....	0.075	0.130
	4 and 5.....	0.105	0.160
	6 and 8.....	0.120	0.175

SPACING OF OPENINGS

8.(a) Spacing of openings shall conform to the following requirements:

Nominal Diameter of Opening, in.	Nominal Width of Metal Between Adjacent Openings, in.
1/16.....	3/64
1/8.....	3/32
1/4.....	1/8
3/8.....	3/16
1/2.....	3/16
5/8.....	3/16
3/4.....	1/4
7/8.....	1/4
1.....	3/8
1 1/4.....	3/8
1 1/2.....	1/2
2.....	5/8
2 1/2.....	3/4
3.....	3/4
3 1/2.....	3/4
4.....	3/4
5.....1	
6.....1	
8.....1	

(b) The openings shall be so arranged that their centers lie at the vertices of triangles which are approximately equilateral within the limits given by the permissible variations in width of metal and diameter of opening.

PERMISSIBLE VARIATIONS FOR OPENINGS AND SPACINGS

9.(a) For screens having openings 1/4 in. or less in diameter, the actual diameter of any opening shall not vary from the nominal diameter by more than plus or minus 5 per cent.

(b) For screens having openings over 1/4 in. in diameter, the actual diameter of any opening shall not vary from the nominal diameter by more than plus or minus 3 per cent.

(c) The width of metal between the adjacent openings in the screen plate shall not vary from the nominal value given in Section 8(a) by more than plus or minus 20 per cent.

SQUARE-HOLE PLATE SCREENS

(Sieves)

SQUARE-HOLE SCREENS

10. Where square-hole plate screens are specified for use, the openings shall be the same as the openings of woven wire cloth sieves, but in other respects, except for the arrangement of the openings, they shall conform to the requirements for round-hole screens specified in Sections 6 to 9.

APPENDIX

METHOD OF CALIBRATING WOVEN WIRE CLOTH SIEVES

A1. The first test of any sieve should be to determine whether it conforms to the specifications. If a suitable standard of powdered or granular material is available for a fineness test, that test is advisable as an additional means of calibration. Pieces of unmounted sieve cloth should be tested in sections of a size suitable for mounting in thesieve frames. In some cases it may be desirable to make a detailed systematic microscopic test of the sieve, plotting the frequency of occurrence of different sizes of openings across the sieve, rejecting, if necessary, a sieve found to have an excessive non-uniformity of sizes of openings for the particular purpose for which the sieve is to be used.

A2. The diameters of the openings of the round-hole screens should be measured by means of an accurate steel rule or by other suitable means. The use of "paddle gages" (flat plug gages) or of taperedpin gages is recommended for checking these openings more precisely.

A3. To determine whether a sieve conforms to the foregoing specifications, the apparatus used may be of the general type as described below and in the National Bureau of Standards Letter Circular 72, July 26, 1922, and the test method may follow the procedure herein described:

The apparatus consists of a light-tight box about 40 cm square and 1 m in length, with a microscope mounted on one end and a ground-glass plate 2 mm in thickness on the other end. The source of illumination is a microscope illuminator containing a concentrated filament lamp, 6 v., 108 watts, connected through a transformer to a 110-v. alternating current supply circuit. The light passes through a lens in the end of the illuminator and is focused on the objective of the microscope. After passing through the microscope it diverges to the ground glass plate which is mounted with the ground side in. A 50-cm steel scale is mounted against the inner face of the ground-glass plate in such a way that the graduations of the scale may be seen through the glass. The position of the scale allows a direct reading on the edges of the image cast by the wire of the sieve and avoids parallax due to the thickness of the glass. By oiling the ground surface slightly, the visibility is greatly increased without diminishing the distinctness of the image.

A frame for holding the sieve is placed on a platform so arranged as to permit a lateral motion of about 8 in., and also motion at right angles for focusing. Long rods, extending to the end of the apparatus at which the observer is seated, enable the observer to move the sieve without leaving his place, the lateral motion being accomplished by means of a rack and pinion and the focusing by the use of beveled gears. If the frame were also provided with a vertical motion, the utility of the apparatus would be increased. A green glass filter is placed between the lamp and the condensing lens. The filter relieves eye strain very considerably and practically eliminates the color bands otherwise appearing on the edges of the image.

In use, the sieve is mounted in its holder on the focusing platform, between the illuminator and the objective of the microscope, and is focused by the observer until a sharp image is seen on the ground glass. Measurements are then taken in millimeters by reading the positions on the steel scale where the two edges of the image of the wire cross it, a reading glass being sometimes used. The sieve is then moved across the field, readings being taken at several places on the cloth, until the whole diameter of the sieve has been traversed, care being taken at the same time to watch for the uniformity of spacing and to measure any excessively large openings. The sieve is then rotated through 90 deg. and the process repeated.

The magnification of the apparatus may be determined by means of a calibrated stage micrometer.

By using a microscope having a tube about 15 cm long and an eyepiece with a magnifying power of approximately eight diameters, together with a 16-mm objective, a magnification of about 250 diameters is obtained.

The National Bureau of Standards has found by experience that in testing sieves for conformity to standard specifications, the most reliable results are obtained by measuring the wire diameters and determining the number of wires per centimeter, and then computing the average opening. From five to ten wires, sometimes more, are measured depending upon the uniformity of diameter of the wire, the closeness of the measurements of the cloth to the limits permitted by the permissible variations, and the experience of the observer. Four measurements are made on each wire. Large openings are measured at the same time.

Magnifications found suitable and convenient at the National Bureau of Standards are:

Sieves	Magnifications
590 micron (No. 30) and coarser.....	45
500 to 250 micron (Nos. 35 to 60), incl.....	90
210 to 37 micron (Nos. 70 to 400),incl.....	250

Greater magnifications would be feasible if the distance from the microscope to the ground-glass plate were increased, provided the optical parts of the microscope were of sufficient quality.

In making all measurements, the readings of the steel scale are estimated and recorded to 0.1 mm.

The most generally used method of determining the mesh of the sieve is by means of what is sometimes known as "picket-fence interference," also the "moire effect." For the No. 200 sieve, a glass scale is accurately graduated with 200 lines to the inch, the opaque lines being about equal in width to the space between the lines. The exact number of lines per unit length is immaterial however, provided the graduation is uniform and the exact number per unit length is known. When a scale such as this is laid on a piece of woven wire cloth having a mesh per unit length approximating the number of lines per unit length on the scale, and a strong light is placed beneath, dark bands will appear which in a unit length are equal in number to the difference between the mesh of the cloth and the graduation of the scale. If the scale is moved lengthwise, in a direction perpendicular to the lines,

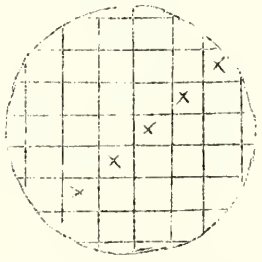

Fig. 1 - Method of Selecting Openings for Plotting of Different Sizes of Openings (see Paragraph A4).
Only the indicated openings are measured.

the dark bands will also move. If these bands move in the same direction as the motion of the scale, the mesh of the sieve is less, if the motion is in the opposite direction, the mesh is greater than the number of lines on the scale. If some bands move in one direction and some in the other, the number moving in each direction must be counted separately, and the algebraic sum taken as the number of bands. For sieves 840 micron (No. 20) to 210 micron (No. 70), inclusive, the best results are obtained with a transparent line about the width of a wire diameter ruled on an opaque background. For sieves coarser than these it is usually necessary to count the fringes by the aid of a hand lens using a steel scale as the standard. Scales should be calibrated before being used in testing sieves.

The limiting values for average opening and for maximum opening are found by multiplying the nominal values in column 2 of Table I by the permissible variations expressed in per cent (columns 4 and 5 of Table I) - considered as exact figures followed by zeros after the decimal point - and rounding off the result to the same number of decimal places as given in column 2 of Table I.

A4. If it is desired to plot the frequency of occurrence of different sizes of openings across the sieve, 100 openings in the sieve should be measured in a diagonal direction across the sieve, then 100 openings are measured in a diagonal direction at right angles to the first. Six fields are chosen in each direction, and in any one field the diagonal method of measurement is used as illustrated in Fig. 1.

Each opening is measured between the warp wires and also between the shoot wires; the warp readings and the shoot readings are separately tabulated and plotted.

A5. The National Bureau of Standards accepts sieves for test to determine conformity to specifications.

A6. Glass scales such as are described above may be obtained from: Bausch & Lomb Optical Co., Rochester, N.Y., and Keuffel & Esser Co., Hoboken, N.J.

PRESENTATION OF DATA

A7. Sieve tests should be presented in tabular or graphical form in terms of the nominal sieve opening and the percentage by weight. For purposes of comparison the cumulative percentage undersize will be accepted as standard. This does not preclude the representation of percentages on individual sieves, provided the sieve interval is clearly specified as plus one sieve number and minus another, or as between two sieve apertures. Graphical representation may include the use of logarithmic scales, probability paper, etc., to emphasize specific characteristics of shape.

A8. The presentation of data for round-hole screens should follow the same general procedure as that specified in Paragraph A7 of this Appendix for square apertures, but in all cases the term diameter should be applied to the size of the opening.

DEPARTMENT OF COMMERCE
National Bureau of Standards

Test Fee Schedule 217.- STANDARD SIEVES AND SIEVE CLOTH

Effective August 1, 1932, superseding all previous schedules for the items covered.

Item	Description	Fee
217a	Testing Sieve - test of any sieve to determine conformity to U. S. Standard Sieve Series specifications, but not including the sieving test on any sieve, (the sieving test being made only on specific request, item 964n) when submitted in lots of less than five, each....	$ 3.00
217b	Same, in lots of five or more, each	2.50
217c	Sieve Cloth - test and report on a piece of sieve cloth, per square foot	3.00
964n	Determination of Sieving Correction on full-height No.200 cement sieve	10.00
217x	Copies of certificates or reports previously issued or reissue of worn or damaged certificates or reports returned, each $0.25, minimum fee	1.00
217z	For special tests not covered by the above schedule, fees will be charged dependent upon the nature of the test.	